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The One Component Plasma: a paradigm for Warm Dense Matter JEAN CLEROUIN, PHILIPPE ARNAULT, CEA,DAM,DIF 91297 Arpajon France, CHRISTOPHER TICKNOR, JOEL KRESS, LEE COLLINS, Theoretical Division, Los Alamos National Laboratory, Los Alamos, NM87545 USA — We study the static and dynamical properties of plasmas using orbital free molecular dynamics simulations in the hot and dense regime. Because such simulations do not make any assumptions on ionization and screening we call them real plasmas. Thanks to a systematic comparison with the one component plasma (OCP) structure we define an effective OCP (eOCP) from which a coupling parameter Γ_e and an effective ionization Q_e are deduced. It is shown that, while eOCP is relevant for the short-range structure at high temperatures, screening manifests itself at long range. Dynamical properties are characterized by different frequencies of oscillation that can be reconciled using a renormalized mass. Since the short time scales and the relaxation times are similar, transport properties can be derived through a connection to the eOCP. Collective modes confirm that screening is important at low wavenumber k (long distance) allowing for the definition of a sound speed, but that eOCP behavior is recovered at high k (short distance) conditions.

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